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KENYA: SEEKING REMEDIES FOR DESERT ENCROACHMENT

UNESCO's Integrated Project in Arid Lands (IPAL) reviewed

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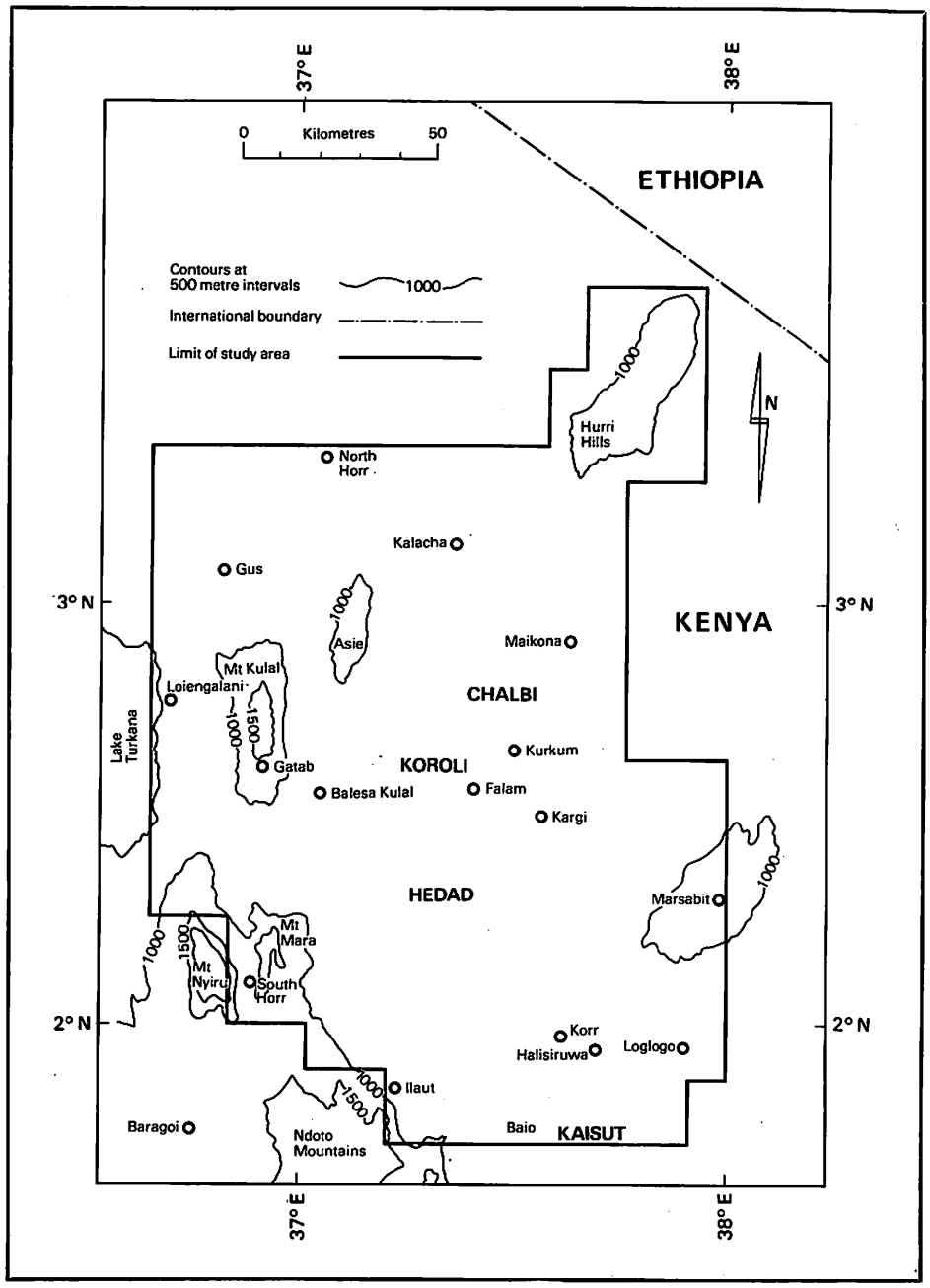
The immediate causes of 'desertification' in the arid zone of north-east Africa and the Sahel are overgrazing and woodland felling. A number of underlying, indirect causes, however, results from the difficulties of reconciling traditional nomadic pastoralism with modern influences and expanding human and livestock populations. The author (until recently its Coordinator) shows how the IPAL programme of research in northern Kenya – a regional project intended to obtain results widely applicable in the African arid zone – is attempting to solve some of the ecological and socio-economic problems associated with desert encroachment.

The Integrated Project in Arid Lands was established as a pilot operation to initiate research into the causes and effects of desert encroachment in a sub-desert region: one inhabited by nomadic pastoralists, where a money economy has yet to replace the ancient livestock economy. The main purpose of the project is scientific enquiry by a multidisciplinary team into the deleterious changes taking place in this arid zone ecosystem. There is also an important second objective – that of seeking practical modifications and alternatives to the traditional livestock-based economy, which might enable the degraded grazing lands to be rehabilitated.

The broad scope of the problems associated with desert encroachment and its control has become increasingly apparent to the scientists engaged in the project during the last four years. Overgrazing and excessive tree felling are the most immediate and obvious causes of 'desertification' in north-eastern Africa but the degradation of enormous areas of grazing land and woodland in dry tropical Africa can also be attributed to the underlying administrative and socio-economic factors associated with such regions of low economic potential. Some of these factors are shown diagrammatically in the figure.

Field work started in 1976 and is intended to produce results by 1983. It has been carried out mainly in the sub-desert country of northern Kenya, between Lake Turkana (Rudolf) in the west and Mount Marsabit in the east (see the map), a study area of 22 500 km², mostly about 500 m above sea level, while preparatory reconnaissances have been made in Sudan and Tunisia. In the latter country another programme of arid zone research, following the IPAL pattern, has recently been started by UNESCO.

The area in northern Kenya which is the subject of the IPAL study described in the text.



Background

More than half the land surface of Kenya is arid or semi-arid rangeland occupied by traditionally nomadic pastoralists of several tribal groups. Like tribes living elsewhere in north-eastern Africa and the Sahelian

zone, they subsist almost entirely upon their herds. But unlike the greater part of the Sahel there is virtually no arid zone agriculture in Kenya, and consequently little of the interdependence between agriculturists and pastoralists which is characteristic of the Sahelian zone. The small amount of grain food consumed by the pastoralists in northern Kenya is brought into the region from outside.

The overwhelming problem of the arid regions of north-eastern Africa and the Sahel alike is the apparent incapacity of the land to support, on a sustained yield basis, the numbers of domestic animals owned by the pastoralists and, in many cases, needed for their subsistence. Over-exploitation – first of the grasses and other vegetation, followed by the trees and shrubs – with concurrent soil erosion, compaction and desiccation, is causing a decline towards desert conditions over large areas. The result is a reduction in the capacity of the land to support the numbers of people who occupy it. The problem is aggravated by population growth, which in northern Kenya is running at 2%

Water supplies. The main cause of the degradation is the new trend towards settlement in the traditionally nomadic tribes. Centres of human and livestock concentration have arisen and have expanded rapidly round the few springs and wells, but especially near boreholes which have been installed recently. While fresh water is the main attraction for such concentrations, shops, schools, medical centres and famine relief centres are additional incentives to settle.

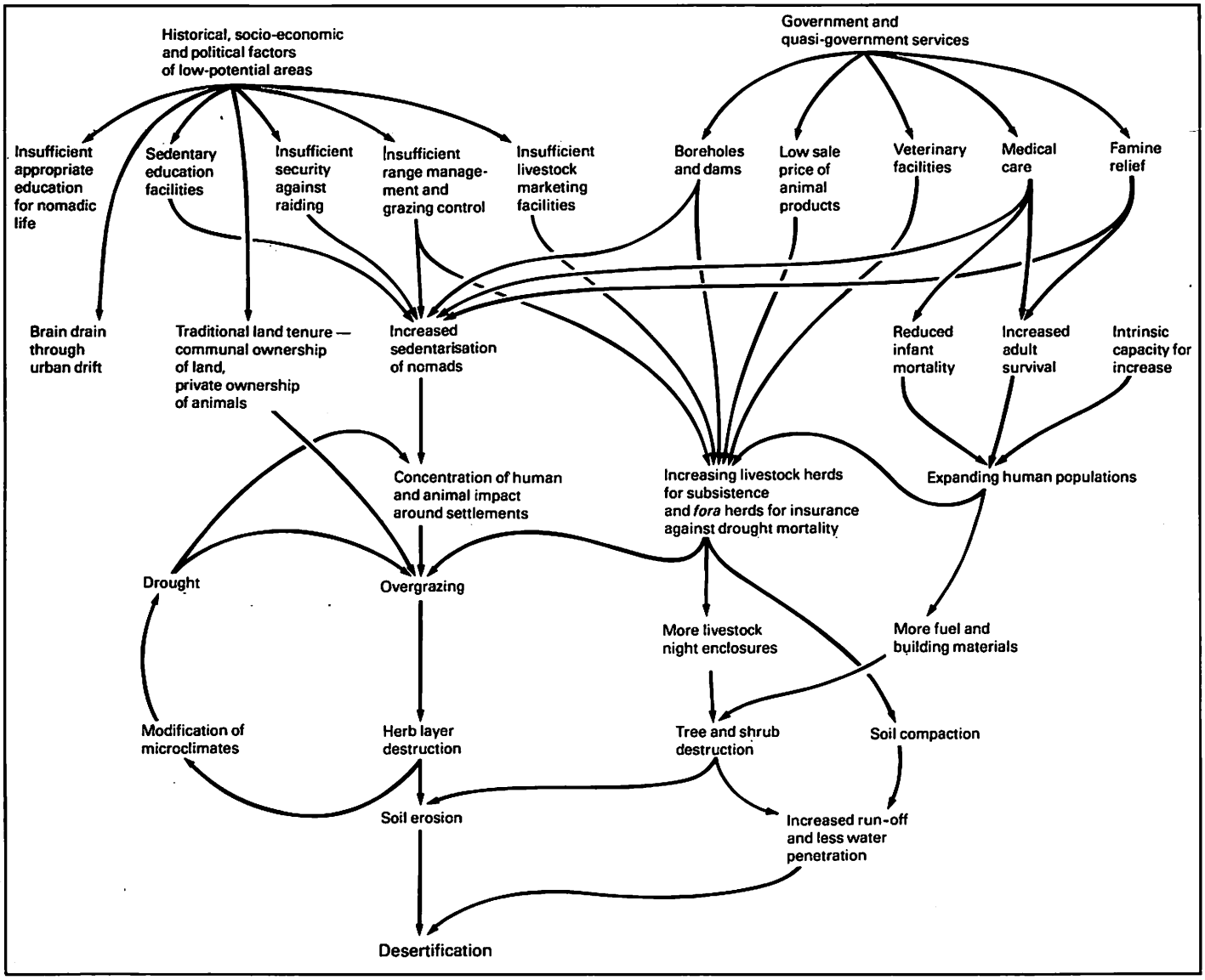
Of equal importance is the protection which the villages, many with small police posts, offer against inter-tribal raiding. Lack of security over large tracts of land is a major reason for avoiding them and for the gross over-exploitation of the more secure areas. Each concentration area becomes a nucleus of denuded land, from which the degradation spreads in widening circles, as the people are obliged to go further for grazing and for the wood they need for both fuel and livestock fencing. Localised desertification appears to be gaining pace as a growing proportion of the pastoral population becomes settled.

In each dry season, and also through the more prolonged droughts, such as that of 1968 to 1976, there is an almost total dependence upon the few perennial water supplies, and the destructive effects of the concentration are most marked. During and immediately after the rains, the traditional dispersal of nomadic families takes place as they move into areas where rain has fallen and new growth has appeared.

This dispersal still occurs, although on a much reduced scale, and an increasing proportion of the population, especially the women and children and the older men, remains close to the villages, keeping their milch animals with them. The young men continue to move out into the surrounding country, taking the unproductive animals (known as the *fora* herds), males, castrates and barren females, following traditional nomadic practices.

Fora herds. The fora herds serve as insurance against drought and other misfor-

Some of the factors which cause desert encroachment in northern Kenya. (Reproduced from Nature and Resources, **14**, *4, 1978.)*



tunes, including theft and death from disease. In favourable years they may appear to be a large surplus stock of unproductive animals which contribute to the depletion of the vegetation. It is questionable, though, whether their reduction would significantly lessen the rate of desert encroachment, for they are mobile and widely dispersed and appear to have relatively little impact upon the vegetation.

Excessive stocking rate. Among the inescapable constraints to the management and the desired diversification of land use in this region is the dry and variable climate. With a mean annual rainfall of less than 150 mm, sustained agriculture is not possible over the greater part of the region and animal husbandry will inevitably remain the basis for the economy. In a purely pastoral society, in which a minimal subsistence herd for a family of between six and eight people is about 50 cattle (or their productive equivalent in sheep and goats or camels), it can be calculated that about 1200 kg liveweight of domestic stock (five cattle, 2.5 camels or 25 sheep and goats) is necessary to support one person.

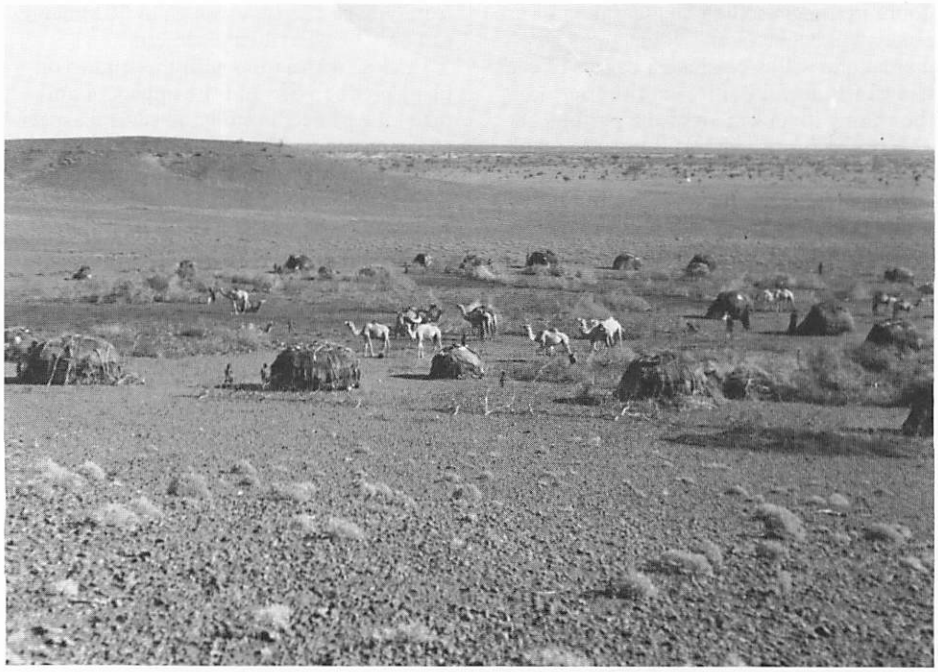
The project study area contains some 30 000 people who are supported by about 36 000 000 kg liveweight of domestic stock. Although this implies a stocking level barely sufficient for the subsistence of the human population, it is evident that, under present pastoral regimes – and more particularly in view of the increasing tendency of traditional nomads to settle – the long-term carrying capacity of large areas of savanna rangeland is being greatly exceeded.

During years of favourable rainfall (as in 1977 and 1978) there may be a temporary abundance of animal fodder, with a resulting increase in the herds. This leads to overstocking in subsequent dry years when plant production is greatly reduced. Prolonged drought inevitably causes high mortality in the herds, but by the time this happens considerable damage will have been done to the vegetation.

Traditional pastoralism

As yet no system exists in the region for the management of grazing. Traditional land tenure among pastoral tribes ensures communal ownership of the grazing resources within each tribal area, although there is individual ownership of livestock. It is not surprising, therefore, that nobody takes responsibility for the maintenance of the pastures and uncontrolled competition for the limited grazing.

Although many pastoralists see the need to reduce stocking rates, substantial culling of their herds is very unlikely for several reasons. Under their existing economy the majority of the families are already at or near the subsistence level and cannot afford to reduce their herds. The richer families are reluctant to reduce their stock, which represents not only their livelihood, but capital, insurance and prestige as well. And in this region the prices offered to the pastoralists are commonly too low to persuade them to sell many animals during times of abundance.



A Rendille nomadic village, or manyatta, *in the IPAL study area. The working area is the home of the greater part of the Rendille tribe and also includes a large part of the Gabra tribe; both are nomadic pastoralists who keep camels, sheep and goats.*

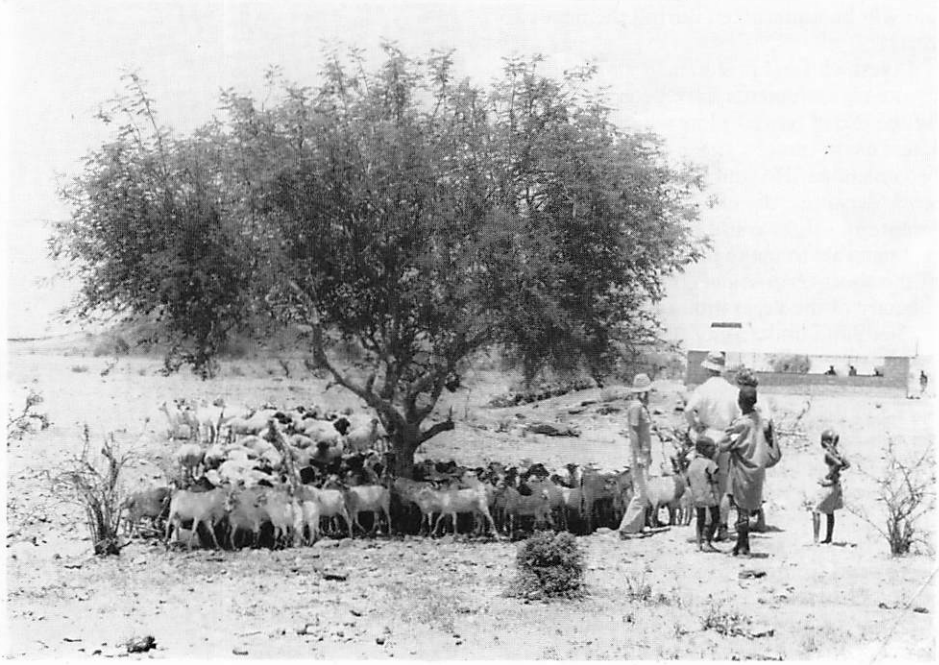
Despite the clear disadvantages in the present livestock economy, the traditional animal husbandry practised by the Gabra and Rendille pastoralists of northern Kenya is in most respects efficient, and well adapted to the harsh and variable climate and to the sub-desert conditions. In any attempt to rationalise land use in the region, traditional practices and skills should not be discouraged, except where they are shown to contribute to environmental damage.

Drought periodically causes famine after a large number of animals have died. With the return of favourable conditions many families have been left without livestock and have become destitutes, dependent upon the continued supply of famine relief food. Such people tend to increase the unproductive sedentary populations and appear to lose their will to return to a nomadic life.

Base-line studies

It is against this background of socio-economic difficulties that IPAL is looking for the means to achieve ecological and social rehabilitation. There can be little

A Rendille sheep and goat herd being inspected by a veterinarian and a livestock ecologist. The animal husbandry is generally efficient and well adapted to the sub-desert conditions.



doubt that far reaching changes in land-use policy will be necessary. Range management alone will necessitate a degree of control which may fail if it is not supported by the willing involvement of the pastoralists. The project's approach to impending land reform, designed to arrest desert encroachment, has been to gain the support of the people through public relations activities.

The first task of the project has been to make an inventory of basic information on the climate, soils, water distribution, vegetation, wild life and domestic livestock; and on human populations and their economics, social and cultural characteristics. Vegetation and soil maps have been prepared; a preliminary analysis of the climate has been made on the basis of past records from the region; and meteorological observations from a network of stations and rain gauges have been set up for the project. In addition to its aridity, the most important feature of the climate is its variability: between 1968 and 1980 the annual rainfall has ranged from 50 mm to nearly 400 mm in the sub-desert areas.

Vegetation and livestock

The main focus of the research programme is the interaction between the pastoralists and their livestock on the one hand, and the vegetation on the other. The capacity of the pastures and woodlands to support livestock depends on the sustainable prodcution of the vegetation. Plant production is closely correlated with rainfall, and the fluctuating climate results in highly variable production from year to year and, due to spatial irregularity as well, to localised variation.

Primary production is measured by the systematic sample clipping of herb and dwarf shrub vegetation, to simulate grazing and browsing. Basic production is expressed as dry-weight per unit area and is related to recent rainfall, and to other characteristics of the site, including topography, drainage, soil type and history of use. The measurement of tree and shrub production is considerably more difficult but will be undertaken during the next two years.

Livestock food preferences and food intake measurements have been obtained by the use of fenced plots where stocking rates, using camels, sheep and goats, could be controlled. By simulating various livestock densities, the effects of grazing at different intensities could be observed, and it was possible to make preliminary estimates of the short-term impact and the carrying capacity of the vegetation type being studied, and under the prevailing climatic conditions.

In the region as a whole livestock numbers and distribution have been assessed periodically from the air. Ten surveys carried out in both the dry and the wet seasons have shown that at least 20% of the study area is heavily overstocked when judged by widely accepted range management standards, and from the results of the project's stocking trials. As would be expected, the overstocked areas are those surrounding the settlements, but they frequently extend out from village centres as much as 30 km and can only be described as deserts.

In close association with the studies on plant productivity and the impact of animals, the project is studying several aspects of the ecology and management of livestock, the object being to understand the quantitative relationships of the herds both with their food resources and with the human populations that depend upon them. Useful results have been obtained on the productivity of camel, sheep, goat and cattle populations – including population dynamics, growth and weight gain, milk production and potential for meat production. Diet and water intake in relation to seasonal changes and availability are being studied.

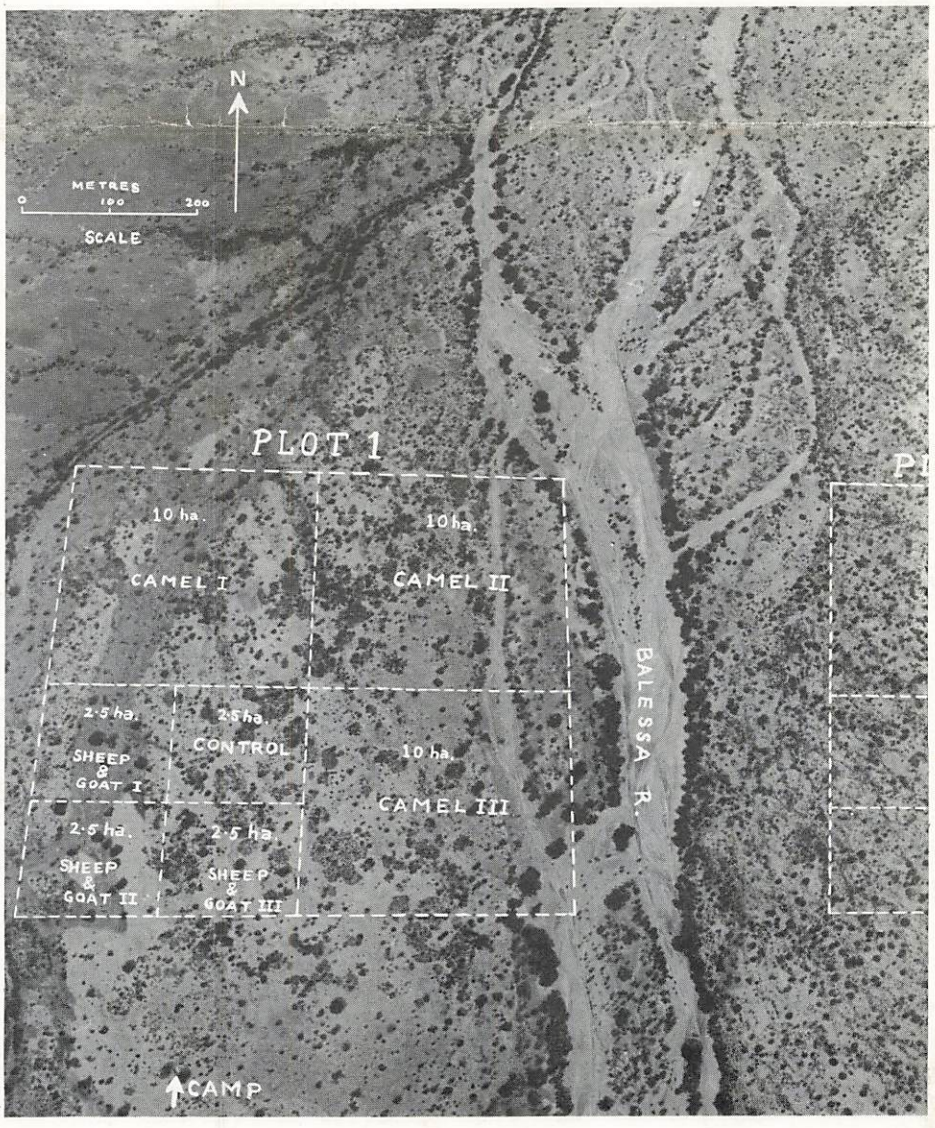
It is evident from the past four years' experience with experimental herds that animal production is markedly affected by disease and parasites. Preliminary disease control trials have shown that, despite the generally high levels of resistance in indigenous livestock, growth rates and milk production are greatly improved by minimal treatment for a small number of diseases. This holds out hope that badly needed increases in animal production might be achieved economically without further increase in animal numbers.

* * *

When IPAL eventually makes recommendations on livestock and range management methods which will be consistent with the rehabilitation of the vegetation, it seems probable that the management guidelines will be based very largely on rational modifications to the traditional methods of animal husbandry now practised by the nomadic pastoralists.

Before any attempt can be made to plan such modifications (possibly including improved breeding, the introduction of controlled grazing, the controlled use of available water, obligatory selective culling of herds and the introduction of animal product marketing) it is essential to gain an understanding of the traditional animal husbandry regimes in the region. For this reason an important component of the project is a study of traditional livestock management methods and their relevance to modern techniques, designed to optimise both production and the conservation of the rangelands.

This aerial photograph has been overprinted with a plan of stocking trial plots at Balesa Kulal in the IPAL study area.



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